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Threaded Ring

The invention relates to a threaded ring, the one-piece body of which is provided with internal threading, has two body components one of which is in the form of a set collar with a plane surface on the end in a radial plane and the other body component of which forms a retaining ring which is connected to the first component to form a gap positioned between the two body components by way of an elastically flexible wall component and which has an actuating mechanism by means of which the geometry of the gap may be adjusted on the basis of the elastic flexibility of the wall component

Threaded rings of this type, which have been disclosed in DE Patent Application 1 675 685, for example, are commercially available and are applied in various areas of mechanical engineering. The body component forming the plane face serves as a high-precision nut seated on the external threading of a shaft or spindle, a nut the axial position of which may be determined with high accuracy by means of the second body component functioning as retaining ring, the threaded flank clearance present between external threading and internal threading being eliminated by suitably modifying the gap between the two body components by means of the actuating device, such modification being made possible by the elastic flexibility of the wall

component joining the body components. Set screws which permit reciprocal tightening of set collar and retaining ring may be provided as actuating mechanism.

The set collar may function as an adjusting nut the end face of which forms a contact surface for positioning of rolling bearings on shafts or as a precisely positioned shaft collar or the like.

In the instances of the disclosed threaded ring described in the foregoing, the gap between the body components is formed by two gap sections offset from each other in the axial direction, one of which extends from the threaded bore to the vicinity of the circumference of the threaded ring and the other radially inward from the circumferential surface to the vicinity of the threaded bore. The two gap sections are separated by the elastically flexible wall component which connects the two body components and the wall thickness selected for which is such that this wall component is elastically flexible enough so that the geometry of the gap may be adjusted by the set screws serving as actuating mechanism so that the threaded flank clearance is eliminated and the retaining effect desired is achieved by tensioning the two body components.

The relatively high production cost is a disadvantage of the disclosed threaded ring. The object of the invention accordingly is to create a threaded ring of the type under consideration which may be produced cost effectively by simple means.

It is claimed for the invention that this object is attained with a threaded ring of the type indicated in the foregoing in that the second body component serving as retaining ring has a circumferential area for formation of the elastically flexible wall component, the external diameter of which circumferential area is reduced in diameter in comparison to that of the first body component, a diameter which extends over a radius smaller than that of the radially external end of the gap, which in turn extends over a radius smaller than the circumference of the

first body component, and in that the circumferential area of reduced diameter of the second body component ends at an axial distance which defines the extent of the flexible wall component in the axial direction.

In that, as claimed for the invention, the elastically flexible wall component is not formed by two separate gap sections which between themselves delimit the wall component, but rather a circumferential area of reduced diameter is formed which ends a certain distance from the gap in the axial direction the radially external end of which extends over a radius larger than that of the circumferential area in question, there is obtained, in the area of the step which joins the circumferential area of reduced diameter to the circumference of the first body component, a wall component adjoining the gap which extends in the axial direction to a distance corresponding to the distance between the gap and the end of the circumferential area of reduced diameter. The value selected for this distance determining the thickness of the wall component is such that the elastic flexibility desired for this wall component is achieved.

In the solution claimed for the invention, production of two gap sections for formation of the flexible wall component is replaced by production of a single one-part gap as internal recess and the external machining of the second body component is required in order in particular areas to reduce the external diameter of this body component. This reduction may be accomplished by simple machining, so that production of the threaded ring claimed for the invention is greatly simplified. It is to be regarded as an additional advantage that no gap section open to the exterior is present on the threaded ring, and accordingly the threaded ring claimed for the invention has a closed circumferential profile. Among other things this prevents the danger of possible deposit of foreign substances during operation in the open gap area on the circumference, such as impurities in lubricants, abraded particles, chips, or the like, something which might lead to the formation of an unbalancing mass on the circumference of the threaded ring.

The circumferential area of reduced external diameter of the second body component preferably is in the form of a cylindrical circumferential surface which extends through the end edge adjacent to the end surface of the second body component to the flexible wall component. Production of a circumferential surface extending from the end edge is extremely simple from the viewpoint of production technology.

The actuating mechanism for modifying the geometry of the gap may include conventional set screws which are uniformly distributed over a coaxial graduated circle, extend through the gap in parallel with the axis, and rest by way of their screw heads on the second body component.

The invention will be described in greater detail below with reference to an exemplary embodiment illustrated in the drawing, in which

- FIG. 1 presents a longitudinal section of only one-half side of an exemplary embodiment of the threaded ring claimed for the invention on a threaded spindle, the diagram being simplified for the sake of greater clarity of presentation of the principle of operation and in particular the threaded flank clearance being shown enlarged and the threaded ring being shown in the unlocked state, and

- FIG. 2 a diagram corresponding to that of FIG. 1, but with the screw-on threaded ring shown locked in position.

The threaded ring shown in FIG. 1 has two primary components, specifically a first body component 1 which functions as set collar or adjusting nut and a second body component 3 which forms a retaining ring. The two body components 1 and 3 are provided with continuous

internal threading 5 by way of which they are screwed on a section of a spindle 9 provided with external threading 7. The body component 1 has on the end a plane surface 11 which functions as contact surface for fixing in position an annular component 13 which is seated on the spindle 9 as shaft collar.

There is between the two body components 1 and 3 a gap 15 which extends in the radial direction from the internal threading and the radially outer end 17 of which is spaced at a radial distance from the circumference 19 of the first body component 1. The second body component 3 has a circumferential area 21 which is smaller in external diameter than the circumference 19 of the first body component 1. This circumferential area 21 of reduced diameter extends in the axial direction from the end edge 23 which adjoins the front surface 25 of the second body component 3 to the vicinity of the gap 15. The step 27 connecting the circumferential area 21 to the circumference 19 of the first body component 1 delimits, together with the gap 15, a wall component 29 by way of which the first body component 1 and second body component 3 are joined as one piece. The thickness selected for this wall component 29, which thickness is determined by the distance between the gap 15 and the axially inner end of the circumferential area 21, is such that the wall component 29 forms a Aweak point,@ that is, represents a flexible wall component which, when the threaded ring is produced from a steel material, permits flexible adjustment of the second body component 3 in relation to the first body component 1, corresponding adjustment of the geometry of the gap 15 being effected, the gap width being modified locally, for example.

Set screws 31, which extend through the gap 15 in parallel with the axis, extending into threaded bores 33 in the first body component 1, and resting by way of their screw heads 35 against the second body component 3, are provided as actuating mechanism for adjustment of the geometry of the gap 15. The set screws 31 are uniformly distributed over a graduated circle concentric with the axis of the threaded ring, six set screws being provided, for example. In the

present example the set screws 31 are configured as screws with recessed hexagon socket screws, the heads 35 of which are seated in an enlarged end section of an associated through bore 37 so that the heads 35 are more or less flush with the outer front surface 25 of the second body component 3.

FIG. 1 shows the threaded ring in the unsecured state, a threaded flank clearance present of threading engagement of internal threading 5 and external threading 7 being shown enlarged for the sake of clarity of presentation. As is to be seen, the flank surfaces of the internal threading 5 positioned on the right side in the drawing are positioned a distance from the flank surfaces of the external threading 7 positioned on the left side in the drawing.

FIG. 2 shows the threaded ring in the secured state, in which, as a result of tightening of the set screws 31, the second body component 3 is braced against the first body component 1 (the drawing being exaggerated in that the front surface 25 of the body component 3 is slightly inclined toward the end surface of the screw heads 35) so that in the instance of the second body component 3 the flank surfaces of the internal threading 5 positioned on the right side rest on the flank surfaces of the external threading 7, while in the instance of the first body component 1 the flank surfaces of the internal threading 5 rest on the external threading 7, so that the unit of the threaded ring made up of body components 1 and 3 braced against each other is secured.

The threaded ring claimed for the invention is designed to be rotationally symmetrical and has no grooves, slots, etc. generating unbalance. The set screws 31 evenly distributed over a concentric graduated circle, in conjunction with the flexible configuration of the wall component 29, produce uniform clamping forces on the threading. These clamping forces ensure intensive contact of internal and external threading 5 and 7 and accordingly high axial rigidity of the threaded ring over the entire circumference. Any form defect adjustments and surface compressions which may be present may be evened out during assembly by increased tensioning

of the body components 1 and 3. The plane surface 11 of the first body component 1 functioning as set collar or tightening ring may be adjusted by targeted uniform tightening of the set screws 31 until complete balance is achieved. If necessary, individual set screws 31 may be additionally tightened to compensate for tension on one side caused by the smallest errors of plane extension of the adjacent components.

As has been stated, the mutual positioning of gap 15 and the axially inner end of the circumferential area 21 of reduced diameter on the second body component 3 defines the wall thickness of the elastically flexible wall component 29. Configuration of the circumferential area 21 is extremely simple with respect to production technology. The degree of flexibility of the wall component 29 is also determined by the distance between the radially outer end 17 of the gap 15 and the circumference 19 of the first body component 1. This radial distance may be determined with no problems with respect to production by selection of the depth of recess of the inner recess forming the gap 15 .